

**REMARKS**

Claims 1-21 were pending in this application at the time of mailing of the instant office action, in which claims 3, 6, 11, 15, 18 are acknowledged by the Examiner as being allowable, but are objected to as depending upon one or more rejected base claims. The remainder of the pending claims are rejected in the instant office action pursuant to 35 U.S.C. §103(a).

As indicated above, claims 1, 7, 9 and 16 are amended herein. Claim 7 is amended to provide antecedent basis for "holes." Each of claims 1, 9 and 16 is amended to clarify the embodiment of the present invention that is recited therein. No new matter is added in these amendments, support for which is provided throughout the application (as filed), including, *inter alia*, within the Figures (e.g., FIG. 2(b) and FIG. 3) and the within the text located between page 22, line 19 and page 23, line 3.

Claims 1, 9 and 16 are amended solely to expedite allowance of this application. By amending these claims, Applicant does not dedicate the subject matter of originally filed claims 1, 9 or 16 to the public and does not acquiesce to the Examiner's rejection(s) of these claims, nor to the reason(s) offered by the Examiner in support of such rejection(s). Applicant also respectfully reserves the right to seek patent protection for claims that are similar or identical to any or all of originally filed claims 1, 9 and 16 in one or more related applications.

Also as indicated above, new claims 22-33 are added herein. No new matter is added in these new claims, support for which is provided throughout the application (as filed), including, *inter alia*, within FIGS. 24(a) and (b) and at page 34, lines 7-14 (for new claims 22-24), within FIG. 16 (for new claims 25-27), at page 22, lines 19-23 (for new claims 28-30), and within FIG. 23(b) (for new claims 31-33).

In view of at least the amendments presented above and/or the remarks that follow, claims 1-33 of this application are believed to be patentable over the cited references, and, therefore, in condition for allowance.

#### The Prior Art Rejections

Pending claims 1, 2, 4, 5, 7-10, 12-14, 16, 17 and 19-21 are rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,389,867 to Ge (hereinafter referred to as "the Ge patent") in view of U.S. Patent No. 6,198,051 to Moshrefzadeh et al. (hereinafter referred to as "the Moshrefzadeh patent") and in further view of Japanese Patent Application No. JP 10-260420 (hereinafter referred to as "the Kaneko reference").

Applicant respectfully traverses these rejections, which are either overcome or demonstrated to be inappropriate in view of the amendments set forth above and/or the remarks presented herein.

In making the pending claim rejections, the Examiner acknowledges that the Ge patent does not disclose a liquid crystal display element that includes connecting electrodes that have holes or a hole section, but asserts that the Moshrefzadeh patent discloses "display substrate electrodes with auxiliary metal layers for enhanced conductivity where the required electrode with holes are disclosed" and that the Kaneko reference "discloses a semiconductor device where the required electrode with holes in the specified manner are disclosed."

Regarding the Moshrefzadeh patent, it teaches forming a metallic film on a transparent electrode in order to increase conductivity of the transparent electrode and further indicates that a periodic array of holes can be provided on the metallic film and can be arranged to allow a significant amount of visible light to be transmitted through the substrate. Therefore, the specific positioning of the array of "holes" on the metallic film is directly related to, and in furtherance of transmitting light through the transparent substrate and does not appear to be in any way related to preventing crack penetration, let alone penetration of a crack in a connecting electrode.

The metallic film of the Moshrefzadeh patent need not have any hole(s) in any portion thereof that does not require the transmission of visible light in the transparent electrode. As such, a flatmetallic film without any hole(s) can be formed in order to increase the conductivity of the transparent electrode.

According to the present invention, and as recited in the claims, a plurality of connecting electrodes are provided on a terminal section of a liquid crystal display element. The terminal section is formed by extending one of the two plastic substrates that are combined to form a liquid crystal display section – that is, the terminal section is positioned at an outer edge of the liquid crystal display section. Thus, there is no need to allow visible light to be transmitted through the terminal section.

Regarding the Kaneko reference, Applicant encloses herein an English language translation thereof in order to provide insight as to its actual disclosure.

The text and figures of the Kaneko reference disclose an arrangement whereby a V-sectioned slit is provided to prevent penetration of a crack or chip that may occur at an end or edge portion of a glass base material positioned nearby (but not at or on) an electrode wiring terminal. What the Examiner alleges are "holes" according to the Kaneko reference are actually V-sectioned slits/grooves, which have a non-penetrating depth that is preferably less than one-third of the thickness of the glass base material.

As indicated by the enclosed translation, the various embodiments of the Kaneko reference disclose forming this slit/groove on a *glass* material – that is, Kaneko does not describe or suggest that its invention is applicable to *plastic* substrates, as recited in the pending claims of the present invention. Also, as is further indicated in the enclosed translation, the Kaneko reference describes that the slit/groove is formed on a glass flat surface, *not* on the actual electrode wiring terminal itself.

In sum, the Examiner's rejections are based on the combination of one reference that – by the Examiner's admission – does not disclose holes, with two additional references that, as indicated above, do not disclose or suggest the claimed invention.

The claimed invention provides a liquid crystal display element that includes two combined substrates (each of which is made of a plastic plate), wherein a terminal section is extended from one of substrates and wherein a plurality of connecting electrodes are provided on the terminal section to connect pixels to a liquid crystal driving circuit. As indicated in the specification of this application, cracks can form in the connecting electrode, and if these cracks penetrate the connecting electrode, electrical disconnection can occur. To combat this problem, and as recited in the claims of the present application, the connecting electrodes are provided with a hole section or a plurality of holes that prevent propagation of any cracks that might form within the connecting electrode.

As indicated above, the cited Moshrefzadeh patent does disclose the presence of holes, but its holes are not located on a connecting electrode, and its holes serve an entirely different purpose - to allow for a significant amount of visible light to be transmitted through a substrate - than the holes recited in the pending claims. The cited Kaneko reference does not discuss or depict holes, but instead discloses the presence of a V-sectioned slit or groove that is formed in a *glass* (not plastic) base material to prevent crack advancement within the glass material itself, as opposed to preventing cracks from propagating within a connecting electrode.

Thus, neither the Moshrefzadeh patent nor the Kaneko reference discloses or suggests positioning holes or a hole section on a connecting electrode to prevent crack propagation within the connecting electrode. Moreover, the Kaneko reference is specifically described solely with respect to glass substrates, not plastic substrates. For at least these reasons, the Examiner's proposed combination of references does not disclose the pending claims, and, consequently, the claim rejections in the instant office action are improper and should be withdrawn.

Additionally, the disclosures of the Moshrefzadeh patent and the Kaneko reference would not have provided the requisite suggestion or motivation (to one of ordinary skill in the art at the time of invention of the subject matter of pending claims) to produce the claimed invention.

Simply put, the Moshrefzadeh patent discloses the presence of holes, but locates these holes on a metallic film in order to serve a purpose (i.e., improving light transmission) that is entirely unrelated to preventing crack propagation in connecting electrodes, and the Kaneko reference discloses the formation of a slit or groove on a glass (i.e., not plastic) base material, rather than on a connecting electrode.

And because this requisite suggestion or motivation is lacking, it is likely that the Examiner has based the pending claim rejections upon an interpretation of the cited references that has been improperly influenced by the teachings of the specification of the present application.

However, such an approach has always been expressly proscribed by the Court of Appeals for the Federal Circuit, as indicated, for example, by *Interconnect Planning Corp. v. Feil*, 227 USPQ 543,551 (Fed. Cir. 1985), which held that one cannot select separate components of an invention from the prior art for combination with the blueprint supplied by the inventor to support a rejection pursuant to 35 U.S.C. §103, and which further held that when prior art references are combined to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself.

These sentiments were echoed in the recent Court of Appeals for the Federal Circuit case of *Crown Operations International Ltd. v. Solutia Inc.*, 62 USPQ2d 1917, 1922 (Fed. Cir. 2002), in which the Federal Circuit cited to several of its earlier decisions in order to emphasize that:

[d]etermination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.” *ATD Corp. v. Lydall, Inc.*, 48 USPQ2d 1321, 1329 (Fed Cir. 1998). There must be a teaching or suggestion within the prior art, within the nature of the problem to be solved, or within the general knowledge of a person of ordinary skill in the field of the invention, to look to particular sources, to select particular elements, and to combine them as combined by the inventor. See *Ruiz v. A.B. Chance Co.*, 57 USPQ2d 1161, 1167 (Fed. Cir. 2000); *ATD Corp.*, 48 USPQ2d at 1329; *Heidelberger Druckmaschinen AG v. Hantscho Commercial Prods., Inc.*, 30 USPQ2d 1377, 1379 (Fed. Cir. 1994) (“When the patented invention is made by combining known components to achieve a new system, the prior art must provide a suggestion or motivation to make such a combination.”).

These cases underscore that there must be a suggestion or motivation to combine references in order to support a rejection based on 35 U.S.C. §103(a), and this suggestion or motivation must not be influenced by hindsight that is based, e.g., on the teachings contained within the specification of the application being examined.

Additionally, the requisite suggestion or motivation to combine cited references must have provided one of ordinary skill in the art at the time of invention of the claimed subject matter with a "reasonable expectation of success" and a suggestion of the "desirability" of the combination. *See, e.g., In re Clinton*, 188 USPQ 365, 367 (CCPA 1976) and *In re Gordon*, 221 USPQ 1125, 1127 (Fed. Cir. 1984). In other words, an obviousness-based rejection (i.e., a rejection pursuant to 35 U.S.C. §103(a)), cannot be based on what one of ordinary skill in the art at the time of invention of the claimed subject matter would have found obvious to *try*. Instead, the cited art must – without consideration of the teachings of the application that is being examined – provide a suggestion or motivation that the resulting combination would produce the claimed invention, *and* that that the resulting combination would be desirable.

In this instance, none of the cited references addresses the problem of crack propagation in connecting electrodes, let alone attempts to solve the problem by providing a hole section or a plurality of holes on the connecting electrodes. The cited references represent various approaches to addressing various other problems, and there is no suggestion or motivation to combine the disclosures of these references in order to produce the claimed invention.



Thus, because the requisite suggestion and motivation to combine the cited references is lacking, the proposed combination is improper and cannot support an obviousness-based rejection pursuant to 35 U.S.C. §103(a). For at least this reason as well, the rejections of pending claims that are based on the combination of the Ge patent, the Moshrefzadeh patent and the Kaneko reference should be withdrawn.

Because the pending claim rejections are believed to be improper, and the new claims are believed to be allowable as presented, the present application is believed to be in condition for allowance, and reconsideration and allowance of the rejected claims and initial consideration and allowance of the new claims are respectfully requested.

If the undersigned can be of any assistance in advancing the prosecution of this case, the Examiner is invited to contact him through the information given below.

Respectfully submitted,



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**Japan s Publication for Unexamined Patent Application****No. 260420-1998 (Tokukaihei 10-260420)****TITLE OF THE INVENTION**

LCD PANEL AND ELECTRONIC DEVICE HAVING THE  
SAME

**[ABSTRACT]****[PROBLEM TO BE SOLVED]**

To provide an arrangement for preventing a crack or chip from expanding at a maximum when made at an end or edge part of a glass base material nearby an electrode wiring terminal of an LCD panel, and to provide an electronic device having the LCD panel.

**[SOLUTION]**

The LCD panel is characterized by including a V-sectioned slit provided nearby the electrode wiring terminal in parallel to, or in perpendicular to the electrode wiring terminal, or so as to surround the electrode wiring terminal. Further, the present invention is characterized in that the LCD panel is provided on an electronic device.

**[EFFECT]**

If a crack or chip is made at an end or edge part of the glass base material nearby the electrode terminals, its spread is stopped by the V-sectioned slit to prevent wire breaking due to the crack or chip perpendicular to the electrode wires at a maximum. Further, if an electronic device has the LCD panel arranged in the foregoing manner,

it is possible to extremely improve a structure of the electronic device and its reliability (quality) in terms of performance.

[CLAIMS]

[CLAIM 1]

An LCD panel, comprising a V-sectioned slit provided nearby an electrode wiring terminal in parallel to the electrode wiring terminal.

[CLAIM 2]

An LCD panel, comprising a V-sectioned slit provided nearby an electrode wiring terminal in perpendicular to the electrode wiring terminal.

[CLAIM 3]

An LCD panel, comprising a V-sectioned slit provided nearby an electrode wiring terminal so as to surround the electrode wiring terminals.

[CLAIM 4]

An electronic device, comprising the LCD panel as set forth in any one of claims 1 to 3.

[DETAIL DESCRIPTION OF THE INVENTION]

[0001]

[TECHNICAL FIELD OF THE INVENTION]

The present invention relates to a structure nearby an electrode wiring terminal of an LCD panel having the electric wiring terminal for electrically making connection with other electronic device.

[0002]

On a glass flat surface nearby an electrode wiring terminal of a

conventional LCD panel, there is provided

1. a V-sectioned slit in parallel to the electrode wiring terminal, or
2. a V-sectioned slit in perpendicular to the electrode wiring terminal, or
3. a V-sectioned slit so as to surround the electrode wiring terminals, so that it is possible to prevent a crack or chip of the base material from expanding at a maximum when external shock or stress is exerted to the periphery of the electrode wiring terminal of an LCD panel. Further, the present invention relates to an electronic device having the LCD panel arranged in the foregoing manner.

[0003]

#### [BACKGROUND OF THE INVENTION]

In a conventional LCD panel, an electrode wiring terminal for electrically making connection with other electronic device is printed on a glass flat surface so as to be positioned outside (away from) a liquid crystal display section (Fig. 5c), and the electrode wiring terminal electrically makes connection with other electronic device via a heat seal, a zebra connector, and the like.

[0004]

#### [PROBLEMS TO BE SOLVED]

In the aforementioned LCD panel, the electrode wiring terminal is printed on the glass flat surface so as to be positioned outside (away from) the liquid crystal display section as described above. In a case where mechanical stress such as external shock or impulse is exerted to the periphery of the electrode wiring terminal, an end or edge part of the glass base material on which the electrode wiring terminal is

printed tends to be cracked and chipped, and the crack or chip expands and reaches the electrode terminal wiring, so that the wiring is cut. Specifically, in case of electrically making connection with other electronic device, a damage varies depending on (i) materials of the heat seal and zebra connector and (ii) a mounting process and a mounting condition thereof. However, a significant amount of mechanical stress is exerted to the periphery of the electrode wiring terminal of the LCD panel, so that an edge part of the glass base material extremely tends to be cracked and chipped.

[0005]

Further, also in case of treating the LCD panel itself, it is necessary to pay sufficient attention in treating the LCD panel since its base material is made of glass. Unless, the LCD panel tends to be cracked and chipped easily. The crack or chip expands and reaches the electrode terminal wiring, so that the wiring is cut.

[0006]

The object of the present invention is to provide an arrangement for preventing a crack or chip from expanding at a maximum when made at an end or edge part of a glass base material nearby an electrode wiring terminal of an LCD panel, and to solve the aforementioned disadvantage.

[0007]

Further, the object of the present invention is to provide an LCD panel having an arrangement for preventing a crack or chip from expanding at a maximum when made at an end or edge part of a glass

base material nearby an electrode wiring terminal of the LCD panel, and to provide an electronic device having the LCD panel.

[0008]

[MEANS TO SOLVE THE PROBLEMS]

The LCD panel recited in claim 1 of the present invention includes a V-sectioned slit provided nearby an electrode wiring terminal in parallel to the electrode wiring terminal.

[0009]

According to the invention, when an end or edge part of the glass base material nearby the electrode wiring terminal of the LCD panel is cracked or chipped, its spread is stopped by the V-sectioned slit provided in parallel to the electrode wiring terminal, so that it is possible to prevent wire breaking due to the crack or chip perpendicular to the electrode wiring terminal at a maximum.

[0010]

The LCD panel recited in claim 2 of the present invention includes a V-sectioned slit provided nearby an electrode wiring terminal in perpendicular to the electrode wiring terminal.

[0011]

According to the invention, when an end or edge part of the glass base material nearby the electrode wiring terminal of the LCD panel is cracked or chipped, its spread is stopped by the V-sectioned slit provided in perpendicular to the electrode wiring terminal, so that it is possible to prevent wire breaking due to the crack or chip parallel to the electrode wiring terminal at a maximum.

[0012]

The LCD panel recited in claim 3 of the present invention includes a V-sectioned slit provided nearby an electrode wiring terminal so as to surround the electrode wiring terminals.

[0013]

According to the invention, when an end or edge part of the glass base material nearby the electrode wiring terminal of the LCD panel is cracked or chipped, its spread is stopped by the V-sectioned slit provided so as to surround the electrode wiring terminals, so that it is possible to prevent wire breaking due to the crack or chip which extends from circumference of the electrode wiring terminals at a maximum.

[0014]

The electronic device recited in claim 4 of the present invention includes the LCD panel as set forth in any one of claims 1 to 3.

[0015]

According to the invention, when an end or edge part of the glass base material nearby the electrode wiring terminal of the LCD panel is cracked or chipped, its spread is stopped by the V-sectioned slit provided nearby the electrode wiring terminal, so that it is possible to prevent wire breaking due to the crack or chip which extends from circumference of the electrode wiring terminal at a maximum. As a result, it is possible to extremely improve a structure of the electronic device having the LCD panel arranged in the foregoing manner and to extremely improve its reliability (quality) in terms of performance.

[0016]

# [INFLUENCE]

The LCD panel is arranged to prevent a crack or chip from expanding at a maximum when made at an end or edge part of a glass base material nearby an electrode wiring terminal , thereby solving the aforementioned disadvantage.

[0017]

# [EMBODIMENTS OF THE INVENTION]

The following description will explain an embodiment of the present invention with reference to attached drawings.

[0018]

(Embodiment 1)

Fig. 1 shows a first embodiment of a structure of an LCD panel (a in Fig. 1) according to the invention recited in claim 1. The structure is such that: outside a wire (d in Fig. 1) which is closest to the edge of glass among electrode wiring terminals (c in Fig. 1) of the LCD panel, the V-sectioned slit (e in Fig. 1) is made in parallel to the electrode wiring direction. Consequently, if a crack (f in Fig. 1) or chip (g in Fig. 1) is made at an end or edge part of the glass base material nearby the electrode wiring terminals, its spread is stopped by the V-sectioned slit (e in Fig.1) to prevent wire breaking due to the crack (f in Fig. 1) or chip (g in Fig. 1) perpendicular to the electrode wires at a maximum. The slit (e in Fig. 1) may be sectioned in a semicircular or square shape. The depth T of the slit depends on a thickness D of the glass base material, and it is preferable to set the depth T as shown by the following equation in consideration of the product strength and reliability.



[0019]

$T < 1/3 \cdot D$

Fig. 2 shows a first embodiment of a structure of the LCD panel (a in Fig. 2) according to the invention recited in claim 2. The structure is such that: a V-sectioned slit (e in Fig. 2) is provided nearby the electrode wiring terminal (c in Fig. 2) of the LCD panel so as to be positioned on an edge (edge of glass) side in perpendicular to the electrode wiring terminal direction (in parallel to the glass edge). Consequently, if a crack (f in Fig. 2) or chip (g in Fig. 2) is made at an end or edge part of the glass base material nearby the electrode wiring terminals, its spread is stopped by the V-sectioned slit (e in Fig. 2) to prevent wire breaking due to the crack (f in Fig. 2) or chip (g in Fig. 2) parallel to the electrode wires at a maximum. The slit (e in Fig. 2) may be sectioned in a semicircular or square shape as in the embodiment of claim 1. The depth T of the slit is set as in the embodiment of claim 1.

[0020]

Fig. 3 shows a first embodiment of a structure of the LCD panel (Fig. 3a) according to the invention recited in claim 2. The structure is such that: a V-sectioned slit (Fig. 3e) is provided nearby the electrode wiring terminal (Fig. 3c) of the LCD panel so as to surround the electrode wiring terminals (along a line of the glass edge). Consequently, if a crack (Fig. 3f) or chip (Fig. 3g) is made at an end or edge part of the glass base material nearby the electrode wiring terminals, its spread is stopped by the V-sectioned slit (Fig. 3e) to prevent wire breaking due to the crack (Fig. 3f) or chip (Fig. 3g) which extends from circumference of

the electrode wires at a maximum. The slit (Fig. 3e) may be arranged in the same manner as in the embodiment of claim 1. The depth T of the slit is set as in the embodiment of claim 1.

[0021]

Fig. 4 shows a first embodiment of the electronic device according to the invention recited in claim 4.

[0022]

#### [EFFECT OF THE INVENTION]

As described above, according to the present invention, when an end or edge part of the glass base material nearby the electrode wiring terminal of the LCD panel is cracked or chipped, its spread is stopped by the V-sectioned slit provided in parallel to the electrode wiring terminal, so that it is possible to prevent wire breaking due to the crack or chip perpendicular to the electrode wiring terminal at a maximum.

[0023]

Further, according to the present invention, when an end or edge part of the glass base material nearby the electrode wiring terminal of the LCD panel is cracked or chipped, its spread is stopped by the V-sectioned slit provided in perpendicular to the electrode wiring terminal, so that it is possible to prevent wire breaking due to the crack or chip parallel to the electrode wiring terminal at a maximum.

[0024]

Further, according to the present invention, when an end or edge part of the glass base material nearby the electrode wiring terminal of the LCD panel is cracked or chipped, its spread is stopped

by the V-sectioned slit provided so as to surround the electrode wiring terminals, so that it is possible to prevent wire breaking due to the crack or chip which extends from circumference of the electrode wiring terminal at a maximum.

[0025]

Further, according to the invention, when an end or edge part of the glass base material nearby the electrode wiring terminal of the LCD panel is cracked or chipped, its spread is stopped by the V-sectioned slit provided nearby the electrode wiring terminal, so that it is possible to prevent wire breaking due to the crack or chip which extends from circumference of the electrode wiring terminals at a maximum. As a result, it is possible to extremely improve a structure of the electronic device having the LCD panel arranged in the foregoing manner and to extremely improve its reliability (quality) in terms of performance.

#### [BRIEF DESCRIPTION OF DRAWINGS]

[Fig. 1]

Fig. 1 is a plan view showing a vicinity of an electrode wiring terminal of the LCD panel according to one embodiment of the present invention.

[Fig. 2]

Fig. 2 is a plan view showing a vicinity of an electrode wiring terminal of the LCD panel according to one embodiment of the present invention.

[Fig. 3]

Fig. 3 is a plan view showing a vicinity of an electrode wiring

terminal of the LCD panel according to one embodiment of the present invention.

[Fig. 4]

Fig. 4 shows the electronic device according to one embodiment of the present invention.

[Fig. 5]

Fig. 5 is a plan view showing a vicinity of an electrode wiring terminal of a conventional LCD panel.

[DESCRIPTION OF REFERENCE SIGNS]

- a. LCD panel
- b. Liquid crystal display section
- c. Electrode wiring terminals
- d. Wiring closest to an end part
- e. V-sectioned slit
- f. Crack
- g. Chip
- h. Wire breaking
- i. PCB board
- j. Heat seal
- k. TAB